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Does Public Spending on Youths Affect Crime Rates?

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Abstract

Two important determinants of crime rates in economic theories of crime are deterrent effects and legal income opportunities. For at least two reasons, youth crimes do not fit into this picture since: 1) most youths do not work 2) deterrent effects, in terms of punishment, are non existent or reduced for youths. Understanding the processes behind youth crimes is important for the reduction of crime both in the short and the long run. This paper explores the role of public spending on youths and crime rates. Using a panel of 261 Swedish municipalities the effects on four crime rates of leisure related municipality expenditure and municipality expenditure on upper secondary school are explored using non-linear fixed effect models. The main findings of the paper are: 1) there exists statistically significant effects of the two types of spending on crime rates 2) there is a trade off between fighting different crimes, i.e. spending that reduces one type of crime might increase another type 3) the effects differ, both in direction and magnitude, between different types of municipalities, e.g. rural vs. urban 4) the effects are not constant, but rather increasing/decreasing in spending level.

Keywords: H39, K4
JEL Classification: Youth crime, public spending, leisure, school

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1 Introduction

Thinking of public spending and crime, expenditure on law enforcement and the judicial system is perhaps what comes into mind first. And indeed Becker's (1968) seminal paper, introducing crime into modern economic analysis, deals with the issues of optimal law enforcement and punishment. However, there are several other plausible channels through which public spending can affect crime rates, both in the short run and in the long run. This paper considers public spending on schooling and leisure activities, and the effect on crime rates.

Crimes committed by youths pose interesting questions in the light of empirical studies and economic theorizing of crime. Much of the economics literature on crime takes its departure in "crime as work"-models, where crime is essentially seen as employment, and competes with legal employment for the use of time (for a seminal contribution see Ehrlich 1973). However, most youths do not work; in Sweden there is compulsory school attendance for nine years (up to the age of 16), and many stay in school for another couple of years at upper secondary school.[1] Youths hence face a somewhat different choice than adults, as they allocate their time between school, leisure activities, criminal activities, and, for some older youths, work. This opens up a broader policy arena, where policies can be directed towards crime.

One important aspect of economic theories of crime is the deterrence effect that the judicial system provides. When an individual commits a crime there is a risk that he/she gets caught, which will entail some sort of punishment, e.g. a fine or incarceration. The punishment will induce a cost, which will lower the potential payoff from a crime making crime a less attractive activity. The deterrence effect for youths might however not be as strong as for adults. For individuals under 15 years of age in Sweden there is no direct deterrent effect since they cannot be prosecuted (Clevesköld and Thunved 2001). Furthermore, imprisonment of offenders between the age of 15 and 17 should in practice not be common, and between the age of 18 to 20 prison time should be reduced compared to older offenders. Even though there exist some empirical evidence from the U.S. that young individuals are just as responsive to punishment as adults (Levitt 1998), the desirability of harsher punitive policies against young individuals can be questioned, giving greater importance to preventive policy measures.

Furthermore, empirical evidence suggests that there is a positive relationship between criminal activity in young years and adult years (see for

[1] In year 2000 about 77 percent of all individuals between 16 and 19 attended upper secondary school (The web site of the *Swedish Association of Local Authorities*, www.svekom.se)

example, Kalb and Williams 2002, or Williams and Sickles 2002). This relationship implies that policies that reduce youth crime might be important policy instruments for reducing future adult crime. Hence, it is important to understand how different types of policies, including public spending, affect youth crime.

One can imagine at least two different levels where public funds can be spent. First, at a micro/individual level, i.e. by providing incentives directed towards specific individuals. Early interventions and support in cases where a youth is considered to be in the habit of becoming a career criminal, for example. Second, at a macro/community level, e.g. by providing a social environment that offers alternative activities to crime. Even though it might be possible to identify individuals who are in a high risk category of committing crime, it would be near to impossible to predict the criminal behavior of low risk individuals, which still can answer for a large portion of the crimes. This situation makes the macro/community level interesting.

Using a panel data set covering 261 out of Sweden's 290 municipalities for the years 1998 to 2001, this paper examines the effects of municipality spending on upper secondary schools and leisure related spending on crime rates. The paper is structured as follows. In the next section a broad picture is given over the criminal activity of youths in Sweden. In this picture youths are overrepresented in terms of persons found guilty and persons suspected of committing crimes. This picture leads to the conclusion, with some reservations, that a large share of crimes originates from youths. Section three discusses the literature concerning the topic. The economics literature is quite thin on the topic, but the sociological literature offers some theoretical background on why the types of spending considered in this paper might affect youth crime. The empirical model used is presented in section four, and section five presents the data. Section five also discusses data quality, an issue which is important when considering crime statistics. Section six presents the estimation results and as we shall see there is some evidence of a relationship between the spending types used here and crime rates. Finally, section seven discusses the estimation results and concludes the paper.

2 Youths and Crime: Some Figures

In this section the sub population of interest here, youths, will be described and their criminal activity will be briefly discussed. Most figures presented will be for the year 2000, but any given year covered in the analysis later would give a similar picture. As will be discussed more thoroughly in section five, crime statistics must be interpreted with care since the nature of

the phenomenon of crime affects the quality of the statistics gathered. The statistics do not measure the true criminal activity, but rather the amount that is recorded. The magnitude of the measurement error varies over time, space and type of crimes. Answering questions about crime is therefor a risky business that calls for great caution. However, different types of statistics might still provide an overview of the situation.

In *Figure* 1, the age distributions of persons found guilty of various criminal offences in year 2000 are displayed. The statistics show the principal offence, i.e. the most serious offence if they were convicted of more than one crime, of persons found guilty. Noting that only about seven percent of the total population were between the ages 15 and 20 we can conclude that they are overrepresented for all crimes displayed [2]. Almost 20 percent of all persons found guilty of any offence this year were youths.

Going into more detail we can see that the proportion of youths increases for several crimes. For all Penal Code crimes the share increases to around 30 percent.[3] A figure that carries over to the sub groups of Crimes against Life and Health (e.g. murder and assault), and Theft, Robbery and Other Crimes of Stealing. The majority of persons found guilty of Crimes against Life and Health is found guilty of assault, where youths account for just above 30 percent. Disaggregating the second group of crimes even further we can see that for robbery and vehicle theft youths dominate with just above and below 60 percent, respectively. Another major crime category where youths are grossly overrepresented is Crimes of Inflicting Damage (e.g. vandalism and graffiti) with about 50 percent of all the persons found guilty. For drug crimes we are back at 20 percent.

However, interpreting these figures as the true picture of the age distribution of all criminal activity is a risky venture. For this picture to carry over to all criminal activity we must assume that the risk of getting caught and found guilty is the same regardless of age and the same regardless of, for example, what type of robbery one commits. Even though this might seem as a reasonable assumption it might be as with most things; practice makes perfect, and then youths are more likely to be caught and found guilty. On the other hand, older individuals which are known by the police as criminals might be more likely to be discovered if they commit crimes. Furthermore, youths move around in a more controlled environment, e.g. school, which increases the risk of detection and commit crimes in groups (Coleman and Moynihan 1996). The latter have been shown to increase the risk of detection

[2] In year 2000 there were in Sweden 612,829 persons between 15 and 20 out of a total polpulation of 8,882,792. (*Statistic Sweden*'s web site, www.scb.se)

[3] For specific details of the Penal Code, see Ministry of Justice (1999).

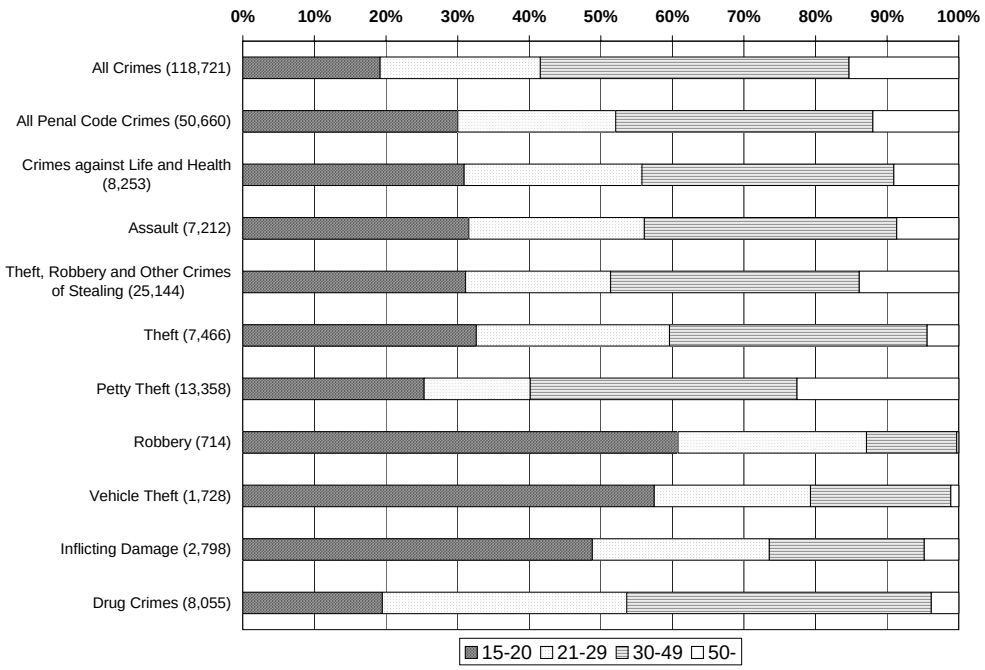

Figure 1: Age distribution of persons found guilty of criminal offences, by principal offence, 2000. Total number of persons in parenthesis. (Source: Table A1)

and apprehension. We also have to keep in mind that we are looking at the principal offence of persons found guilty. This may distort the picture somewhat. For example, crimes of inflicting damage, expect of gross offences, have a narrow range of punishment, and is therefore seldom the principal offence if committed together with another offence. However, we can conclude that of all the persons found guilty of criminal offences a disproportionate share is youths, which at least indicates that youths account for a significant share of certain criminal activities.

The statistics over persons suspected for different crimes let us in more detail consider which crimes youths are involved in, i.e. typical youth crimes, since the registration is more detailed. However, how we define a typical youth crime affects the results. The crimes most often committed by youths are different type of burglaries, inflicting damage, and petty theft (National Council for Crime Prevention 2001). But these crimes are also among the most common adult crimes. Crimes where youths are dominating among the offenders are auto theft, bag snatching and robberies of individuals. In *Figure* 2, the age distributions of persons suspected of various criminal offences are

displayed for the year 2000.

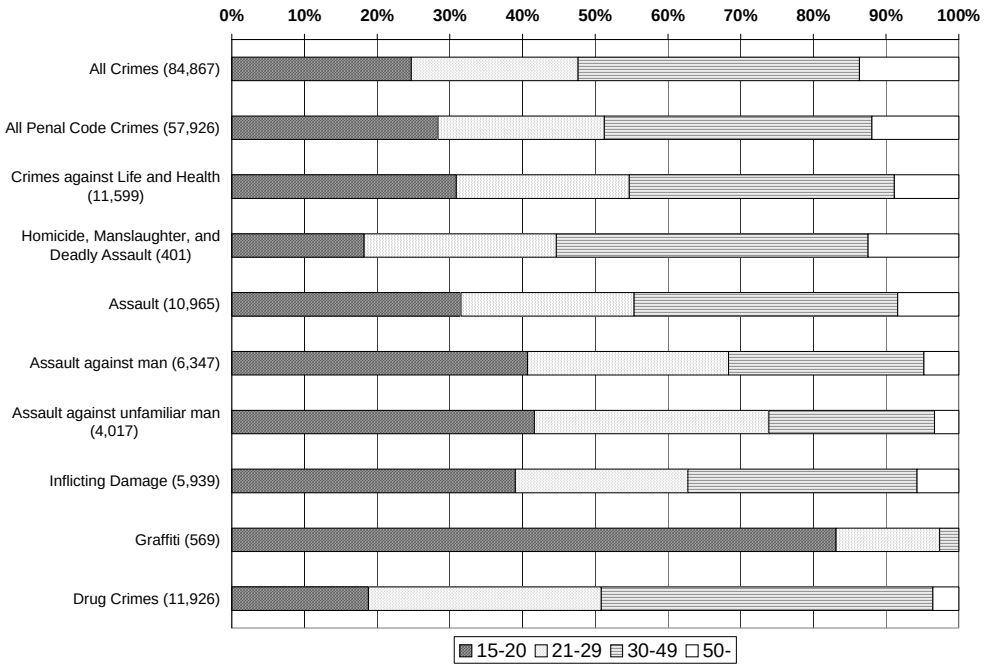

Figure 2: Age distribution of persons suspected of criminal offences, 2000. Total number of persons in parenthesis.(Source: Table A2)

The percentage of persons suspected for any crime is a bit larger than for persons found guilty for youths, and a bit smaller for all Penal Code crimes. For Crimes against Life and Health the percentage is about the same for suspected as for found guilty. However, if we disaggregate these crimes we can see that youths have a smaller share in deadly violence, with less than 20 percent of the persons suspected of homicide, manslaughter or deadly assault. Turning to the more common crime of assault we can see that the percentage increases to above 30 percent for youths. Among assault, assault against men are the most common and here youths account for just above 40 percent. Going even further down we can see that assault against men where the offender is unknown to the victim constitutes the majority of the cases of assault against men. For this category of crime youths constitute an even bigger share of the suspected offenders.

Crimes of Inflicting Damage is a common crime among youths as we can see in the figure. Just below 40 percent of all suspects are youths. Turning to the specific crime of Graffiti we can see that almost 85 percent of all suspected

offenders are youths. And, finally, for drug crimes we see that we have the same percentage youths as for persons found guilty, about 20 percent.

Figure 3 displays the age distributions of persons suspected of criminal offences against chapter 8 of the Penal Code; Theft, Robbery and Other Crimes of Stealing. As we can see in the figure the majority of suspects for robbery and gross robbery are youths with over 50 percent. More than half of these suspects are suspected of robberies of individuals, and for this crime youths account for just above 60 percent.

Turning to burglary we can see that the majority of suspects of burglaries committed at schools, libraries and similar venues are youths with almost 60 percent. This share decreases for burglaries at industrial premises, construction sites and similar venues and are lowest for burglaries into private houses with about 25 percent. The same picture carries over to theft and petty theft from different venues. For theft from schools, libraries etc., youths constitute almost 75 percent of the suspects, whereas only about 15 percent of the suspects of thefts from industrial premises and construction sites are youths. Of all the suspects of auto theft around 45 percent are youths, while for the more uncommon moped theft, more than 65 percent are youths.

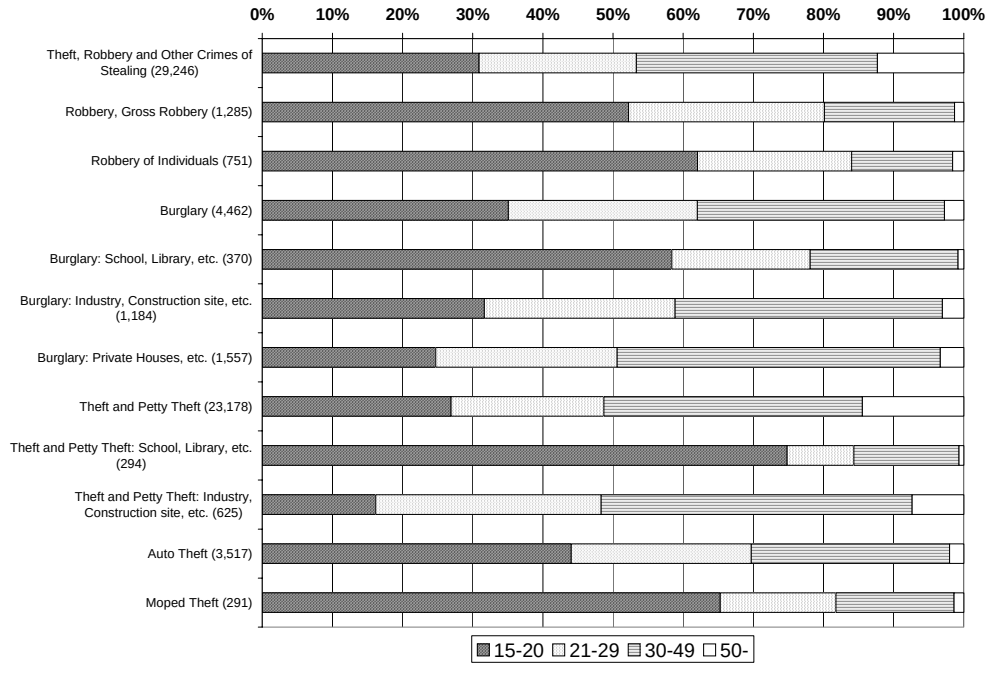

Figure 3: Age distribution of persons suspected of Penal Code chapter 8 offences, 2000. Total number of persons in parenthesis. (Source: Table A2)

Table 1: Juveniles' participation rates in different crime related activities. Results from three self-report studies

	Boys			**Girls**		
	1995	1997	1999	1995	1997	1999
Theft related	73.0	67.1	65.5	58.9	55.5	52.1
Violence related	29.8	23.5	27.9	11.4	9.7	10.3
Inflicting damage related	53.1	47.5	44.0	37.7	31.4	29.4
Drug related	9.1	9.6	10.8	7.3	7.2	7.7

Source: National Council for Crime Prevention (2000)

There are other sources of crime statistics than the official statistics. A series of self-report studies were made in Sweden during the 1990's where up to about 6,000 pupils in grade nine (most of the respondents where 15 years old) were asked different questions about criminal activities (for details see National Council for Crime Prevention 2000). In *Table* 1 some of the results are reproduced. Participation rates in different criminal activities are higher for boys than for girls. Furthermore, a majority of the respondents reported that they had participated in some sort of theft related activity, where theft from school and stores are the most common, with participation rates around 70 percent for boys and around 55 percent for girls. For the other categories, we can see that the participation rates are lower for both boys and girls, with less than 10 percent for drug related activities in most years. Vandalism constitutes the biggest share of activities related to inflicting damage, whereas carrying a knife is the most common reported violence related activity. Even though the quality of the data can be questioned, we can certainly conclude that criminal activity is fairly widespread among the respondents[4].

We have seen that youths are overrepresented in the official crime statistics, both regarding persons found guilty and persons suspected of crimes. The reason for this might be measurement errors, a question we will come back to in section five, or simply that they commit more crimes than adults. That there is some degree of bias in the statistics, unfavorable for youths, is reasonable to assume, but that all overrepresentation is due to measurement errors is highly unlikely. Furthermore, from the figures presented here we cannot tell anything about the criminal activities of individuals under the age 15. Persons under the age of 15 do not end up in the statistics of guilty or suspected offenders since they cannot be prosecuted. If they were to be included, the share of youths would become larger.

[4]For a discussion of self-report studies, see Coleman and Moynihan (1996).

3 Public Spending, Youths, and Crime

In Sweden, the municipalities have the main responsibility for local leisure related policy areas. However, this local responsibility rests on a voluntary basis and is not determined by law. The most important areas are sport and youth policies. Even though voluntary, most municipalities have similar policies, which include support to local sports clubs and other clubs, in terms of both cash grants and subsidized venues. The rules for eligibility for this support varies between municipalities, both in terms of ages and activities (Swedish Association of Local Authorities 2001).

Besides supporting the local clubs, most municipalities have complementary leisure policies, which have developed over time into providing a large variety of activities, e.g. youth centers, youth cafés, concerts, providing activities outside the established club structure (Swedish Association of Local Authorities 2002). A final important aspect of the leisure policies are the supply of venues for sports and other activities, which is a main responsibility for the municipalities. The supply of activities and how much resources that are spent differs among municipalities.

Another important area of public spending on youths is school expenditure. By law, the municipalities have the sole responsibility for the school system (Skolverket 1997). Within the objectives and framework established by the Government and the Parliament, the individual municipalities determine how its schools are run. This includes the resource allocation between the different parts of the school system.

For all students that have completed the 9 year compulsory school, the municipalities are by law obliged to offer upper secondary schooling, which is voluntary for the students. Most of the upper secondary schools are run by the municipalities, but there is a growing number of independent schools and some county run schools. The cost per student differs among municipalities, to some extent dependent on what type of programs that are offered (Skolverket 2002). The major part of the costs is teaching costs, followed by venue costs, textbooks and teaching aids, and, finally, a small fraction is school meals and student well being.

An interesting question is whether or not there are any relationships between these expenditures and the crime rates in the municipalities. There is a vast literature, both theoretical and empirical, containing contributions from many disciplines, on the determinants of crime. We will here briefly discuss some of the economics and sociological literature relevant for the issue studied here.[5]

[5] See for example Entorf and Spengler (2000) for a survey of the literature.

3.1 The Literature

The literature discusses at least three channels through which leisure and school activities might affect crime in the short run. First there is an incapacitation effect, which is the time use aspect of participating in different activities. While engaged in leisure and school activities, youths' time is occupied and cannot be spent committing crime. The second channel is through the interaction with other individuals, which can both increase and decrease crime. The last channel is the increase in crime opportunities that arise when more activities take place away from home. These three channels are more or less emphasized in different strands of the literature and come in different guises.

The incapacitation effect and the interaction with other individuals, although in the form of supervision, are highlighted in social disorganization theory (STD) (Sampson and Groves 1989). According to SDT, crime is a result of undesirable developments at the community level . When a community's structure cannot, due to disorganization, realize the common values of the residents and maintain social control, crimes occur. The structure of the community consists of social networks, both formal and informal, and the collective supervision that the community directs towards local problems.

In this structure there are three different dimensions where the community can intervene to gain social control. The first one is the ability to supervise and control teenage peer groups. Examples of this are supervised leisure activities for youths and intervention in street-corner congregation. The second dimension is informal local friendship networks. When residents form local social bonds they can easier recognize strangers and act as guardians against crime. Furthermore, the networks also provide constraints on delinquent behavior of residents in the community. The last dimension is the rate of local participation in formal and voluntary organizations. The efforts to solve common problems and socialize youth against delinquent behavior are to a large extent dependent on the communities organizational base. The success of such efforts depends on the communities ability to encourage high rates of participation in formal as well as voluntary groups.

The sources of social disorganization are hypothesized to be five factors: socioeconomic status, resident mobility, ethnic heterogeneity, family disruption, and urbanization. Communities with low economic status lack funds and resources, and will therefor have a weaker organizational base than higher status communities. High residential mobility disrupts the forming of local networks of social relations. Ethnic heterogeneity also impedes the forming of networks by hindering communication and patterns of interaction. Family disruption decreases informal social control at the community level. A

two parent household is assumed to provide more guardianship and supervision, both of their own children and property as well as for general activities in the community. The level of urbanization affects the social control by weakening the local kinship and friendship networks, and by impeding social participation in local affairs.

The time use aspect of criminal activity is also present in much of the economic literature where "crime as work"-models are frequently used. However, as noted in the introduction, most youths do not work so thinking of criminal activity as an alternative to legal work is not appropriate for this subgroup. The choices facing youths are more elaborate; school, leisure, criminal activity and for older youths, work. Leung (2002) presents a time-allocation model for these choices. Through the process of social capital accumulation, i.e. productive resources accumulated by an individual through participation in activities that develop strong social networks, different institutions and environments affect the individual's time allocation choices.

In the model, time is allocated between the four different activities in an expected utility framework. The individual maximizes the utility received from the returns of the different activities: working gives wages, doing crime produces some loot, and school increases the future wages. The maximization is done under the uncertainty whether or not the individual gets caught doing crimes. If caught a penalty is received, which besides a fine or the cost of incarceration, which give rise to the usual deterrence effects, could include a non-pecuniary cost the individual imposes on himself.

In the model time spent on crime, work and school are assumed to generate activity specific capital, which among other things affect the returns from spending time on different activities. Participation in and the quality of institutions or networks, such that school, market work, church, family and peers, that improve school and work capital formation reduce the time spent on crime. Delinquent peers promote the accumulation of crime specific capital and increases time spent doing crimes.

The idea that social capital or the interaction with other individuals can serve as a deterrent is stressed in social control theory (SCT). SCT takes deviant behavior for granted and does not ask why individuals commit crime, but rather why individuals refrain from criminal activity (Matsueda 1989). Individuals refrain from criminal activity because they have a bond to society and therefore conform to the legal code. The strength of the social bond differs between individuals, explaining why some commit more crime than others. Individuals compare costs and benefits of different alternative actions, and choose those that are most likely to maximize their pleasure (Hirschi 1986). The strength of the social bond, the social control, affects the costs of deviant activities, such as committing crime. The bond's strength depends on

four intertwined factors: attachment, commitment, involvement, and belief.

Attachment to others, e.g. parents, peers, and teachers, affects the weight put on negative reactions to criminal behavior when calculating the costs of an action. Commitment to conventional activities, such as education, raises the cost of criminal behavior. The larger investment that is made in conventional activities, the more is there to loose by criminal behavior. Involvement in conventional activities limits the time that can be spent contemplating and committing crimes. And finally, belief in conventional norms and values dissuades an individual from behavior against these norms and values. The higher value these four factors attain the more likely it is that an individual conclude that the cost of committing a crime is too high and refrains from committing it.

Differential association theory (DAT) also holds the interaction with peers and family as important factors determining crime (Matsueda 1982). In a modern heterogenous and segmented society there exists conflicting definitions about appropriate behavior. The process of learning these different definitions, 'differential association', takes place in intimate personal groups through interactions. Favorable and unfavorable definitions, for law violations, are given different weights depending on frequency, duration, priority and intensity. Definitions that are presented more frequently, earlier in life and from a more important source is given more weight in the learning process. An individual becomes a criminal if there is an excess of favorable (for law breaking) definitions. Thus, peer and family interactions play a central role in DAT, but these are not always crime decreasing. Structural conditions, such as class, age, sex and family status affect the criminal activity by determining the exposure to different definitions.

The above mentioned theories are either stressing factors associated with incapacitation and social interaction. However, an alternative approach is criminal opportunity theory (COT) (Miethe, Hughes, and McDowall 1991). COT focuses on conditions that have to be fulfilled for a crime to take place, rather than why individuals commit crime or what motivates them. A criminal act has three minimal elements that must be fulfilled for it to take place; a likely offender, a suitable target, and the absence of capable guardians against crime (Cohen and Felson 1979). All these three elements must converge in time and space for a crime to take place.

Conventional activities affect the probability of convergence. Activities may take place at home, in jobs away from home, and in other places away from home. Changes in activity patterns away from home increases the crime rate because they either increases the exposure to motivated offenders, increases target attractiveness, or decreases the guardianship (Miethe, Hughes, and McDowall 1991). Exposure to crime refers to a targets visibility and ex-

posure to risky situations and locations. Target attractiveness is defined both in symbolic and material value to the offender. And guardianship refers to the ability to prevent crime from taking place.

3.2 School, Leisure, and Crime

Let us turn back to the question, posed in the beginning of this section; of whether or not there are any relationships between leisure and school expenditures and the amount of crime committed in a municipality. At the individual level, participation in leisure activities and commitment to school can have a crime reducing effect, both by taking time from the individual and by increasing the cost of committing crime through social interactions. However, spending time in school and at leisure activities with delinquent peers could have a crime increasing effect. At the municipality level, the ability to organize youths in organizations and activities could be an important factor to socialize youths and to control youths' behavior. But we have also seen that increased participation in activities away from home could increase crime by providing more opportunities for crimes to take place.

Public spending on school and leisure activities could affect the amount of crime. Starting with school activities there are many possible factors that determine how much time youths spend at school activities; for example, parents and peers can be assumed to play important roles. How much time that is spent on school is also a function of the juveniles motivation/commitment/involvement. It is plausible that public spending on schools, e.g. remedial teaching, counselors, number of teachers per student, class size, venues, home-language instruction, affects the motivation of students and their time spent doing school work.

Turning to leisure activities we can think of several activities, e.g. participating in sports, playing an instrument, staying at home watching TV or playing computer games, involvement in organizations and political parties, more or less organized activities in youth recreation centers etc., that might serve as meaningful ways to spend time. We can categorize the activities into activities supervised by adults and activities unsupervised. For the issue considered here, supervised activities are perhaps the important ones, since public funds can be spent on these and hardly on computer games.

Preferences about leisure activities are for sure diverse, some individuals might enjoy sports others prefer to hang around at a youth recreation center. Whether or not an individual participates in an activity will depend on several factors; peers, parents and the cost of participating, for example. The likelihood of participating in any legal activity ought to be increasing in the number of alternatives at hand and decreasing in the cost of participating.

A local supply of many different activities at low cost might therefor increase the number of individuals participating in legal activities. Furthermore, a local public supply of infrastructure for activities, e.g. sports centers and other venues, is a prerequisite for the presence of many different clubs and activities. Furthermore, public spending in form of for example grants and subsidies for different activities helps funding many activities.

Thus, there might on theoretical and intuitive grounds be both positive and negative relationships between spending on school and leisure, and crime.

4 Empirical Model and Estimation Technique

We are interested in explaining the variation in crime rates across time and space, i.e. how different variables affect the crime rates. Assuming that there is an underlying process that connects per capita crime rates, C, and different observable variables, x, such that

$$C\left(x,\beta_0\right)=e^{x\beta_0}$$

where we are interested in estimating the parameter vector β_0. Since crime rates are non-negative, the exponential form is suitable. Furthermore, for the exponential form, any changes are proportional to the crime rate, i.e. $\frac{\partial C}{\partial x}=\beta_0 C$, which seems more plausible than for example constant changes produced by a linear relation.

The crime rate in a municipality is also determined by unobservable factors, α, constant over time and possibly correlated with the observable variables. Furthermore, the crime rate can also be affected by disturbances, u. Thus, we have the following relationship between the crime rate in municipality $i=1,\ldots,N$ at time $t=1,\ldots,T$

$$C_{it}\left(x_{it},\alpha_i,\beta_0\right)=e^{\alpha_i+x_{it}\beta_0+u_{it}}=\mu_i e^{x_{it}\beta_0}v_{it} \tag{1}$$

where $\mu_i=e^{\alpha_i}$, which is a permanent scaling factor of the municipality crime rate, and $v_{it}=e^{u_{it}}$ is the disturbance term. Furthermore, equation (1) is recognizable as the log-linear fixed effect model often estimated in the literature (see for example Levitt 1998, Nilsson and Agell 2003, Entorf and Spengler 2000).

The true crime rates are unobservable, but we can observe the number of reported crimes in each municipality and calculate an approximation of the crime rate. The crimes are discrete events and the number of crimes committed/reported are integers. This will give rise to problems, which must be considered (see Osgood 2000, for a discussion in a cross-sectional setting).

For larger populations, the crime rate estimates will be fairly fined grained. For a population of one million, one additional crime corresponds to 0.1 crimes per 100,000 inhabitants. However, for smaller populations the discrete nature of the crimes will transfer to the crime rates. For a population of 5,000, one additional crime corresponds to 20 crimes per 100,000 inhabitants. Since, the precision of crime rate estimates depend on the population size, we cannot expect the variance of the regression errors to be homoscedastic if we estimate equation (1) with common methods. The smaller the population, the larger the variance. However, we can employ methods that are robust to heteroscedasticity.

Another problem is that the lowest possible crime count, zero, and the corresponding crime rate of zero will be more common and a more natural outcome when the population sizes are small. This is especially true if we are studying specific crimes at a disaggregated level of the data. The censoring will cause the error distribution to become skewed, and a normal or symmetrical distribution cannot be assumed. Furthermore, the log-linear model cannot accommodate the zeros without tampering with the data, such as adding a small positive number to the zeros.

Another solution besides tampering with the data is to aggregate the units of analysis or the crime categories such that a continuous approximation will suffice and zeros will not be a natural outcome. However, in doing so lots of interesting questions are removed from the domain of answers. Yet another solution is to apply a method that can accommodate the nature of the data. As we shall see in the next section, many of the Swedish municipalities are rather small and for some crime categories of interest, the crime counts are small and zero is a fairly common observation. Hence, there is a need to have a model that can handle these features of the data.

The Poisson distribution is useful for modelling non-negative integer outcomes. Let c_{it} be the observed crime count in municipality i at time t, x_{it} and n_{it} be the observable variables and population size at time t, μ_i be an unobservable municipality fixed effect of unknown distribution, and finally let v_{it} be a municipality and time specific disturbance of unknown distribution, but with a conditional expectation of one, i.e. $E\left[v_{it}|x_i, n_i, \mu_i\right] = 1$, where x_i and n_i denotes the whole vector of observations for municipality i. The last assumption implies that our variables are strictly exogenous, which of great importance for the consistency of the estimation results. This assumption will be tested in the empirical section. Following Hausman, Hall, and Griliches (1984) we have the following fixed effect Poisson model (FEP) for the crime counts

$$c_{it}|x_i, n_i, \mu_i \sim Po\left(\mu_i \lambda_{it}\right)$$

where $\mu_i\lambda_{it}$ is the conditional mean of c_{it} and $\lambda_{it} > 0$ is the underlying conditional mean process given by

$$\lambda_{it}\left(x_{it}, n_{it}, \beta_0\right) = E\left[n_{it}e^{x_{it}\beta_0}v_{it}|x_i, n_i, \mu_i\right] = n_{it}e^{x_{it}\beta_0}$$

Thus, the conditional mean of c_{it} is

$$E\left[c_{it}|x_i, n_i, \mu_i\right] = E\left[\mu_i\lambda_{it}|.\right] = E\left[n_{it}C_{it}|.\right] = n_{it}\mu_i e^{x_{it}\beta_0} = \mu_i e^{\ln(n_{it})+x_{it}\beta_0} \quad (2)$$

which is the expected conditional crime rate times the population size. Furthermore, c_{it}, c_{ir} are assumed to be independent conditional on x_i, n_i, μ_i for $t \neq r$.

As for the continuous fixed effect model we must remove the fixed effect in order to estimate β_0. Letting $\underline{c}_i = \sum_{t=1}^{T} c_{it}$ be the sum of crime counts across time then $c_i = (c_{i1}, \ldots, c_{iT})'$, the vector of crime counts, is multinomially distributed

$$c_i|\underline{c}_i, x_i, n_i, \mu_i \sim Mult\left(\underline{c}_i, p_1\left(x_i, n_i, \beta_0\right), \ldots, p_T\left(x_i, n_i, \beta_0\right)\right)$$

where

$$p_t\left(x_i, n_i, \beta_0\right) = \frac{\lambda\left(x_{it}, n_{it}, \beta_0\right)}{\sum_{s=1}^{T}\lambda\left(x_{is}, n_{is}, \beta_0\right)}.$$

Thus, conditioning on the sum of crime counts in the municipality we can remove the fixed effect. Since this distribution does not depend on μ_i we can estimate β_0 with standard maximum likelihood methods. We have the following log-likelihood, excluding parts not depending on β,

$$l\left(\beta\right) = \sum_{i=1}^{N}\sum_{t=1}^{T} c_{it}\log\left[p_t\left(x_i, n_i, \beta\right)\right].$$

Some of the assumptions of the FEP, such as the equality between the mean and the variance of the Poisson distribution, might be a bit restrictive. Furthermore, other assumptions might also be violated, but the FEP model has nice robustness properties.

Since the multinomial distribution is a member of the linear exponential family, the results of Gourieroux, Monfort, and Trognon (1984) on pseudo maximum likelihood estimation imply that if

$$E\left[c_{it}|\underline{c}_i, x_i, n_i\right] = p_t\left(x_i, n_i, \beta_0\right)\underline{c}_i \quad (3)$$

then the multinomial pseudo maximum likelihood estimator (PMLE) is consistent and asymptotically normal, even if the multinomial distribution is

misspecified (for proof see Wooldridge 1999). That is, given that the conditional mean, equation (2), is correctly specified, including the strict exogeneity of x_{it}, our estimates are consistent and asymptotically normal and we can estimate our model without further distributional assumptions. The estimates might not be efficient, however.[6] Furthermore, the ordinary maximum likelihood standard errors are not valid for inference. The standard errors must be made robust against misspecification, which is straightforward (see Wooldridge 1999, equations 3.8 - 3.11). The robust standard errors might be larger or smaller than the ordinary standard errors.

5 Data Description

The data set used here constitutes a balanced panel covering 261 of 290 municipalities in Sweden and the time period 1998 to 2001.[7] The data is compiled from different sources, which together with variable definitions are described in the appendix. As mentioned in section two, the nature of the phenomenon studied affects the quality of the data. Before we go into the data used here a discussion about data quality is warranted.

5.1 Data Quality

There are different types of aggregated statistics concerning crime. We have already encountered two of them in section two; persons found guilty of crimes and persons suspected of crime. Others include the number of reported crimes and clear up rates. The only data over crime available at the municipality level is the number of crimes reported to the police. However, official crime statistics do not measure the actual amount of crimes committed, but rather the amount reported to the police. How large the dark figures, i.e. crimes not reported, are is unknown and varies between different types of crime and over time.

According to Coleman and Moynihan (1996) official crime statistics production can be viewed as a social process. The definitions of what a crime is are themselves results of wider social processes, which reflect religious, political and other considerations, and form the framework for the crime statistics

[6] Given that the assumptions for the FEP are satisfied Hahn (1997) has shown that FEP is the efficient semi-parametric estimator.

[7] Of the 29 municipalities excluded, 23 are are excluded due to missing data. However, Stockholm, Göteborg and Malmö are excluded because of their unique situation, being the only large cities, which can be expected to give them special crime patterns. Furthermore, in 1999 Södertälje was split into Södertälje and Nykvarn, both municipalities are excluded from the analysis. In 2003, i.e. outside our sample, Knivsta was formed.

production. Besides these wider social processes Coleman et. al. divide the process into four main stages: discovery, reporting, recording and 'clearing up'.

First of all, for a crime to be recorded it must be discovered and considered as a criminal offence. Individuals differ in their notion and knowledge of what constitutes a crime, and for some crimes there are no victims to discover the crime or the victim might be unaware that a crime has been committed. For certain crimes where there is no clear victim who has an interest of bringing the crime to the attention of the police, such as drug related crimes, the police plays an important role in discovering them.

The agent who discovers the crime must report it to the police in order for it to become a figure in the statistics. The propensity to report is therefore central for how large the under-coverage is. The seriousness of the crime affects the propensity to report, more serious offences are more likely to be reported. However, the social and psychological context, such as the nature of any relationship to the offender, expectations of police reaction or performance, implications of insurance policies held, fears about possible consequences of reporting, also matters.

The propensity to report also varies over time. For example, there have been considerable changes in the way schools handle school yard fights resulting in increasing reports of assault due to a higher propensity to report to the police (Estrada 2001). Furthermore, other factors such as economic cycles and socioeconomic factors may affect the propensity to report. MacDonald (2000) examines the probability to report a burglary in Britain and finds that socioeconomic factors and economic cycle factors, such as unemployment, affect the propensity to report. Thus, affecting the size of the dark figure.

When a crime is discovered and reported to the police it must be recorded and classified. Differences in practices and recording procedures might exist over time and space, making intertemporal comparisons and comparisons between countries problematic.

Finally, in order to produce statistics tied to individuals, such as persons found guilty, the crime must be cleared up. The term cleared up is a bit misguiding. For example, all crimes where the crime can not be proven and is written of are considered cleared up. Clear up rates differ between different crime types over time. Crimes where there is an interaction between the offender and the victim typically have a higher clear up rate than crimes without interaction. Crimes where the offender is at the scene at the time of the police arrival have the highest clear up rates. Police resources and priorities also affects the clear up rates for different crime types.

Although there are some problems with measurement errors this might

not cause too much estimation problems, as long as we have an estimation method that can handle these problems. A plausible assumption about the error structure is that it is multiplicative, such that the reported crime counts are a fraction of the true amount of crimes committed. If the fraction is constant over time in each municipality, possibly dependent on the explanatory variables, the measurement error will be a part of the municipality fixed effect, and will not cause any problems. Furthermore, if the fraction varies over time and is the same in all municipalities, the inclusion of time dummies will capture the measurement error, and our estimation results will not suffer from any measurement error problems. If the measurement error fraction varies over time and space the measurement error will be a part of the disturbance term. As long as the measurement error is uncorrelated with our independent variables this will cause no problems. However, if there is a correlation the strict exogeneity assumption will be violated, and our estimates will be inconsistent.

5.2 Dependent Variables

Ideally we would like to have the actual number of crimes committed by youths in each municipality as the dependent variable, but as noticed in section 2 these are not available. Instead the dependent variable in the empirical model is the municipality reported crime counts, measured by the number of crimes registered by the police. These are the only crime statistics available at the municipality level. Four different crime categories will be used. Since we are interested in the effect of public spending on youths and crime, but we have no data on their criminal activity, crimes mainly committed by youths will most likely contain a relationship if at all there is any.

As we noted in section two, youths are overrepresented in the crime statistics both regarding persons found guilty and persons suspected of all criminal offences. For some crimes this overrepresentation is larger than for others. Whether this is due to bias in the recording procedure or not is an open question. We will here utilize four crimes; assault against unfamiliar man (ASSAULT), inflicting damage by means of graffiti (GRAFFITI), moped theft (MOPED) and robbery of individuals (ROBBERY).

As discussed above all these variables are subject to measurement error to varying extent. The measurement error in moped theft is probably small since the propensity to report these crimes can be assumed to be high. This is due to the fact that insurance companies demand the crime to be reported to the police for the insurance to be valid (National Council for Crime Prevention 2001). Insurance fraud might also cause crimes to be recorded in

the wrong category, e.g. as moped theft instead as fraud, but this ought to be a small figure.

For the other crimes there are reasons to believe that the measurement errors are larger (National Council for Crime Prevention 2001). For crimes of inflicting damage, including graffiti, the error can be assumed to be large because these crimes are generally hard to clear up. This causes victims to think that a report will result in nothing and is therefore futile. However, it can be assumed that the larger the damage the higher the propensity to report. Furthermore, if the damage exceeds any insurance excess the propensity to report will be higher. Thus, for more serious offences the error can be assumed to be smaller. The same is true for assault, where the propensity to report can be assumed to be higher for more serious offences.

Finally, for robbery of individuals the error can be suspected to be large. The victim of these robberies are usually youths and individuals in asocial environments, both with low propensity to report. The reasons for the low propensity include: a report is seen as futile, a belief that the offenders will not get punished, and victims are afraid of reprisals if a report is made. Thus, all the crimes used here will suffer from measurement errors due to dark figures. However, if the measurement error is a fraction of the committed crimes and constant over time in each municipality it would be a part of the municipality fixed effect.

Another source of concern is that for some crimes, no municipality have been recorded. The number of crimes missing this information varies considerable between different counties and years. The problem is largest in 1996, when the recording of crimes at the municipality level started, and has decreased over time (National Council for Crime Prevention 2002).

Furthermore, recording practices might have changed over time, and may in practice differ between police districts. For example, in 1999 the registration of robberies was changed, and robberies of individuals was reported as a category of its own. Until then registration of these robberies was made under 'Other robberies', separated from more gross robberies, such as bank robbery, but together with a small amount of other type of robberies. The separation of the categories have not been successful in practice and in 2001 most robberies recorded under other robberies were in fact robberies of individuals (National Council for Crime Prevention 2001).

Table 2 displays some descriptive statistics for our crime variables. The smallest possible crime count, zero, is observed for all four crimes. The percentage of the observations that are zero is for ROBBERY 17 percent, MOPED six percent, ASSAULT one percent, and GRAFFITI nine percent of the total number of observations, which is 1,044. Thus, the zero 'problem' is largest for ROBBERY and almost not an issue for ASSAULT, but without

Table 2: Dependent variables, descriptive statistics

	ROBBERY	MOPED	ASSAULT	GRAFFITI
Max	204	408	454	1349
Min	0	0	0	0
1^{st} quartile	1	2	9	2
Median	3	7	21.5	8
3^{rd} quartile	8	18	52	29
Zeros	177	65	12	91
Mean crime rate	24.0	48.1	143.6	114.1
Max crime rate	254.7	339.3	488.5	1563.5

tampering with the data we cannot estimate a continuous model. Furthermore, we can see in the table from the median and the quartiles that many of the crime rates would have been calculated from low counts, making poor approximations of the underlying crime rate. The low crime counts is partly due to the small population sizes of the Swedish municipalities, and that we are studying crimes at a low level of aggregation.

We can also notice that robberies are the least common crime, with the lowest maximum and quartiles, followed by moped theft. Graffiti follows with a low median and quartiles, but with a large maximum count. The highest median and quartiles do assault have, but with a lower maximum count than graffiti. In the table, crime rates, in terms of crimes per 100,000 inhabitants, are also displayed. We can notice that after this normalization there are large differences between municipalities, i.e. there is a large span between the minimum crime rate, zero, and the maximum crime rate for all crimes. Furthermore, the mean crime rate orders the crimes in the same order as the median, and quartiles. Thus, the most common crime is assault, followed by graffiti, moped theft and, finally, robbery.

5.3 Independent Variables

In section three several different determinants of crime were pointed out, but some of these are hard to quantify and data availability limits the scope of including others. However, there are some variables readily available.

First of all, from equation (2) we can see that the model implies the inclusion of the logarithm of the population with a coefficient restricted to one in our independent variables. However, it is also plausible that the per capita crime rates are dependent on the population size. For example, in smaller municipalities where 'everybody knows everybody' the possibility

for anonymity might be smaller than in larger municipalities, which could for example increase the probability of being identified when committing a crime. The increased probability of identification could deter criminal behavior, and thus affect the crime rates. The natural logarithm of population size (POPULATION) is therefore one of the explanatory variables and enters unrestricted. In *Table* 3 some descriptive statistics are displayed for our independent variables. The mean population is around 26,500 whereas the median is about 15,500. Thus, a considerable portion of the municipalities have relatively small populations, and the distribution is quite skewed. Furthermore, there is a large span between the smallest municipality and the largest municipality in the sample.

Turning to the variables of greatest interest here, the expenditure variables, there are two different types of expenditures included. The first one is the leisure related municipality spending (LEISURE). Included in this variable are the municipalities' spending on grants to clubs and associations, sports and recreational venues, and youth recreation centers. Furthermore, the variables is measured in 100 Swedish Kronor (SKr) per capita, and is in 1998 year's prices. The mean and the median are a bit below 1,000 SKr per capita, and we have a large span from 155 to 3,561 SKr per capita suggesting that the policies differ quite substantially between the municipalities.

The second type of expenditure is the municipality expenditure on upper secondary schools (EDUCATION), measured as 10,000 SKr per student in 1998 year's prices. Included in this measure is all the municipalities' spending on upper secondary schools, e.g. spending on teachers, venues, and teaching aids.

In section three we discussed the possible impact of these variables on crime rates and the effect could go in either direction. Furthermore, the two expenditure variables enter the model both in levels and in squares to allow for decreasing and increasing effects.

The demographic and the socioeconomic status and composition of the municipalities are controlled for with seven different variables, which can be expected to influence the crime rates. Starting with the demographic variables, the percentage of men aged 15 to 19 (MEN1519) and the percentage of men aged 20 to 24 (MEN2024) in each municipality are included in the model. Since we are focusing on crimes that can be thought of as youth crimes the larger the proportion of young individuals the higher the crime rates for these crimes. Furthermore, men tend to be more crime prone than women. Therefore are these demographic variables included in the model.

In section three theory pointed to, among other things, socioeconomic status, resident mobility, and ethnic heterogeneity as factors behind crime rates. The socioeconomic variables included here are the average income

Table 3: Independent variables, hypothesized signs and descriptive statistics

Variable	Mean	s.d.	Min	Max	Median
POPULATION	26,511	27,139	2,668	190,342	15,513
MEN1519	3.14	0.27	1.91	4.23	3.13
MEN2024	2.70	0.49	1.74	6.03	2.59
INCOME	11.10	1.60	8.12	24.11	10.83
UNEMPLOYMENT	4.50	1.74	0.95	11.50	4.38
WELFARE	4.32	1.55	0.60	11.01	4.16
MOVING	4.50	1.36	1.82	11.63	4.30
IMMIGRANTS	3.81	2.73	0.72	27.62	3.07
LEISURE	9.75	3.50	1.55	35.61	9.40
EDUCATION	7.42	1.03	4.85	11.48	7.31

(INCOME) measured as the per capita taxable income in 10,000 SKr, the percentage of the population above 17 years of age receiving social welfare payments (WELFARE), the percentage of the population aged 18 to 64 that is registered as unemployed (UNEMPLOYMENT), the percentage of individuals with foreign citizenship (IMMIGRANTS), and the percentage of the population that moves into a municipality a given year (MOVING). The first three variables can be thought of as measuring the socioeconomic status of the community, and the last two ethnic heterogeneity and resident mobility, respectively.

According to social disorganization theory crime rates should be decreasing in income, and increasing for the other variables. However, higher income implies higher attractiveness of targets for crimes and higher concentration of targets, e.g. in our case more mopeds to steal or richer individuals to rob, which according to criminal opportunity theory should increase crime. Higher unemployment rates might also lead to increased supervision of youths and guardianship over property, which could decrease crime rates. All in all the signs of these variables could always be discussed, but these variables are not the focus of this paper. These variables are included to control for observed heterogeneity, which can be expected to affect crime rates.

The Swedish municipalities differ in many ways which affect the number of crimes observed. Some ways are unobservable. These will be accounted for by the fixed effect, if they are constant over time. Other ways are more or less observable and the variables discussed above hopefully takes these into account. However, it is plausible and quite probable that the effects, both in magnitude and direction, of the variables differ between different types of municipalities. For example, the effect of leisure expenditure might be

Table 4: Municipality groups

Dummy		N
D1	Large city municipalities	24
D2	Sparsely populated municipalities	25
D3	Small municipalities	39
D4	Rural municipalities	28
D5	Industrial municipalities	43
D6	Large municipalities	29
D7	Medium-sized city municipalities	39
D8	Suburban municipalities	34

quite different between a sparsely-populated rural municipality and an urban municipality. In order to allow for different effects, the municipalities are divided into eight groups according to *Table* 4.[8] Interaction terms between our expenditure variables and group dummies (D2, D3, ..., D8) are included in the model. D1 is left out in the estimations. Furthermore, time dummies are also included to capture developments of the crime rates over time.

In this set of independent variables, an important group of variables are missing; deterrence variables, such as clearance rates, sentence lengths, and police expenditure, which are of great importance in economic theories of crime. Unfortunately there is no deterrence variables available at the municipality level. However, if these variables are fixed for the time period studied they will become part of the fixed effect. Otherwise the effect of these variables will be part of the disturbance term and cause problems if they are correlated with our explanatory variables. Furthermore, all municipalities face the same justice system, which implies that changes in the justice system will at least affect the municipalities in a similar fashion. Thus, any changes to the justice system will be picked up by the time dummies.

Furthermore, some of the variables used here might not be strictly exogenous. This could be the case for the variables of greatest interest, the expenditure variables. If the politicians conceive them as crime fighting tools shocks to the crime rates will cause changes in the expenditure. Fortunately, we can test the assumption of strict exogeneity.

[8] The groups follow the *Swedish Association of Local Authorities'* classification of municipalities based on certain criteria, such as population size, population density, labor market aspects. See appendix for further details.

6 Estimation Results and Specification Testing

In *Table* 5, estimation results from the multinomial pseudo maximum likelihood estimator (PMLE) are displayed for our different crimes. Ordinary maximum likelihood estimates of the standard errors are reported in parenthesis and the robust counterparts are reported in brackets. All discussions about significance refer to the robust standard errors, and is noted in the text, e.g. (0.05) for significance at the five percent level.

The interpretation of the coefficients is fairly straightforward, keeping in mind that the coefficients originates from the underlying crime rate process. For the logarithm of the population, the coefficient minus one is the constant elasticity between crime rates and the population; for the other variables the elasticity varies.[9] However, we can easily calculate the elasticities at specific values, e.g. at the means of the variables. Elasticities for significant variables are shown in *Table 6* for MOPED and in *Table 7* for GRAFFITI; for the other two crimes elasticities will be presented in the text.

Starting with the first row in *Table* 5, we notice that the logarithm of the population size is only significantly different from one in the case of MOPED theft, with a t-value of 2.69, indicating an elasticity between moped theft crime rate and population size of 5.7. For the other crime variables there is no effect of population size on the crime rates.

Table 5: Estimation results: Multinomial PMLE

Variable	ROBBERY	MOPED	ASSAULT	GRAFFITI
ln(POPULATION)	-0.9560	6.6592	0.6048	1.8600
	(1.6192)	(1.0752)	(0.6728)	(0.7488)
	[1.8364]	[2.1028]	[0.9416]	[3.9140]
MEN1519	0.3705	0.0407	0.3429	0.1133
	(0.2266)	(0.1571)	(0.0930)	(0.1027)
	[0.2847]	[0.2758]	[0.1167]	[0.5324]

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MLE standard errors in parenthesis, robust standard errors in brackets.

All models include time dummies.

[9] If we include the logarithm of the population and one other variable, including its square, as regressors we have the following relation in the model, excluding subscripts $\lambda = nC = ne^{\ln(n)(\beta_n-1)+x\beta_1+x^2\beta_2} = e^{\ln(n)+\ln(n)(\beta_n-1)+x\beta_1+x^2\beta_2} = e^{\ln(n)\beta_n+x\beta_1+x^2\beta_2}$ where we estimate the β:s. We get the following elasticities: for the population size $\frac{\partial C}{\partial n}\frac{n}{C} = (\beta_n-1)\frac{C}{n}\frac{n}{C} = (\beta_n-1)$ and for the other variable $\frac{\partial C}{\partial x}\frac{x}{C} = (\beta_1+2x\beta_2)C\frac{x}{C} = (\beta_1+2x\beta_2)x$ and if the square is not included $\frac{\partial C}{\partial x}\frac{x}{C} = \beta_1 C\frac{x}{C} = \beta_1 x$.

Table 5: Continued

Variable	ROBBERY	MOPED	ASSAULT	GRAFFITI
MEN2024	-0.4667	0.4054	-0.1425	0.3701
	(0.1850)	(0.1301)	(0.0766)	(0.0822)
	[0.2254]	[0.2348]	[0.1123]	[0.4424]
INCOME	-0.8766	-2.0555	-0.2246	-2.6477
	(0.6678)	(0.4953)	(0.3872)	(0.2719)
	[1.3543]	[0.8673]	[0.4280]	[2.0228]
UNEMPLOYMENT	-0.0476	-0.0249	-0.0139	-0.1015
	(0.0387)	(0.0281)	(0.0154)	(0.0184)
	[0.0458]	[0.0577]	[0.0196]	[0.0857]
WELFARE	-0.0248	0.0549	0.0382	0.1674
	(0.0355)	(0.0283)	(0.0157)	(0.0177)
	[0.0571]	[0.0482]	[0.0189]	[0.1132]
MOVING	0.0249	0.0127	-0.0291	0.0121
	(0.0446)	(0.0339)	(0.0207)	(0.0198)
	[0.0612]	[0.0514]	[0.0235]	[0.1100]
IMMIGRANTS	0.1420	-0.1889	0.0957	-0.1036
	(0.0732)	(0.0559)	(0.0303)	(0.0382)
	[0.1022]	[0.0830]	[0.0358]	[0.1535]
LEISURE	-0.0818	0.4679	-0.0406	-1.0254
	(0.1449)	(0.1146)	(0.0531)	(0.0760)
	[0.1691]	[0.1809]	[0.0552]	[0.4448]
LEISURExD2	0.3481	-1.1426	0.0446	1.6718
	(0.6391)	(0.6249)	(0.1428)	(0.2887)
	[0.4130]	[0.5252]	[0.1093]	[0.7559]
LEISURExD3	-0.1094	-0.4278	0.0090	1.3163
	(0.2207)	(0.1695)	(0.1001)	(0.1474)
	[0.1912]	[0.2089]	[0.0850]	[0.5562]
LEISURExD4	0.1134	-0.5411	-0.0640	1.2347
	(0.4161)	(0.3053)	(0.1531)	(0.2040)
	[0.3286]	[0.4076]	[0.2200]	[0.5718]
LEISURExD5	0.0705	-0.5939	0.0648	1.1749
	(0.2532)	(0.1672)	(0.0878)	(0.1273)
	[0.2406]	[0.2246]	[0.1021]	[0.5041]
LEISURExD6	0.1860	-0.5017	0.0555	1.7478
	(0.2271)	(0.1589)	(0.0865)	(0.1889)
	[0.2258]	[0.2102]	[0.0695]	[0.5542]

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MLE standard errors in parenthesis, robust standard errors in brackets.

All models include time dummies.

Table 5: Continued

Variable	ROBBERY	MOPED	ASSAULT	GRAFFITI
LEISURExD7	0.1424	-0.3827	0.0795	0.5059
	(0.2698)	(0.1928)	(0.0928)	(0.1191)
	[0.2820]	[0.2340]	[0.1106]	[0.5189]
LEISURExD8	-0.1605	-0.5344	-0.1288	1.0722
	(0.2099)	(0.1596)	(0.1037)	(0.1037)
	[0.2162]	[0.1984]	[0.1345]	[0.5216]
$LEISURE^2$	0.0033	-0.0150	0.0019	0.0461
	(0.0068)	(0.0053)	(0.0024)	(0.0036)
	[0.0076]	[0.0076]	[0.0024]	[0.0212]
$LEISURE^2$xD2	-0.0271	0.0474	-0.0032	-0.0655
	(0.0271)	(0.0272)	(0.0057)	(0.0115)
	[0.0178]	[0.0238]	[0.0041]	[0.0323]
$LEISURE^2$xD3	0.0046	0.0137	0.0010	-0.0560
	(0.0096)	(0.0074)	(0.0042)	(0.0059)
	[0.0082]	[0.0088]	[0.0034]	[0.0243]
$LEISURE^2$xD4	-0.0041	0.0197	0.0068	-0.0711
	(0.0263)	(0.0183)	(0.0099)	(0.0132)
	[0.0209]	[0.0234]	[0.0155]	[0.0349]
$LEISURE^2$xD5	-0.0027	0.0211	-0.0018	-0.0520
	(0.0093)	(0.0067)	(0.0034)	(0.0054)
	[0.0084]	[0.0083]	[0.0031]	[0.0246]
$LEISURE^2$xD6	-0.0120	0.0176	-0.0035	-0.0924
	(0.0120)	(0.0082)	(0.0045)	(0.0097)
	[0.0124]	[0.0100]	[0.0037]	[0.0303]
$LEISURE^2$xD7	-0.0087	0.0124	-0.0048	-0.0193
	(0.0123)	(0.0087)	(0.0041)	(0.0052)
	[0.0132]	[0.0096]	[0.0048]	[0.0236]
$LEISURE^2$xD8	0.0065	0.0166	0.0080	-0.0456
	(0.0105)	(0.0083)	(0.00558)	(0.0053)
	[0.0109]	[0.0087]	[0.0080]	[0.0268]
EDUCATION	-0.3185	-0.4042	0.0001	1.8215
	(0.3941)	(0.3528)	(0.1622)	(0.1781)
	[0.6373]	[0.5135]	[0.1464]	[0.9779]
EDUCATIONxD2	-6.2538	1.0762	-0.4927	-4.7893
	(3.6953)	(1.9471)	(0.6502)	(0.9954)
	[2.9801]	[1.8136]	[0.7143]	[1.7605]

Continued on next page...

MLE standard errors in parenthesis, robust standard errors in brackets.

All models include time dummies.

Table 5: Continued

Variable	ROBBERY	MOPED	ASSAULT	GRAFFITI
EDUCATIONxD3	-0.9990	0.1517	-0.1842	0.0465
	(1.1695)	(0.7607)	(0.3571)	(0.4694)
	[1.0117]	[0.8571]	[0.3855]	[1.7018]
EDUCATIONxD4	1.2619	1.3885	0.6680	-2.7490
	(1.8115)	(1.0241)	(0.6324)	(0.9090)
	[1.2915]	[0.9263]	[0.8046]	[3.2637]
EDUCATIONxD5	-0.9083	-0.3855	-0.3480	2.2666
	(1.0267)	(0.6848)	(0.3719)	(0.5173)
	[0.9834]	[0.8869]	[0.4362]	[1.5537]
EDUCATIONxD6	-1.4279	-0.6230	0.0076	0.4198
	(0.9557)	(0.6571)	(0.3349)	(0.4887)
	[0.9713]	[0.8462]	[0.3864]	[1.9969]
EDUCATIONxD7	0.3143	-0.9015	-0.2702	-2.7954
	(0.6722)	(0.5489)	(0.2672)	(0.3199)
	[0.7977]	[0.7180]	[0.3308]	[1.4476]
EDUCATIONxD8	-0.0005	0.7492	-0.0691	-1.9996
	(0.5135)	(0.4767)	(0.2503)	(0.2284)
	[0.7529]	[0.7422]	[0.3226]	[1.4342]
$EDUCATION^2$	0.0207	0.0236	-0.0001	-0.1195
	(0.0272)	(0.0243)	(0.0111)	(0.0127)
	[0.0428]	[0.0357]	[0.0099]	[0.0710]
$EDUCATION^2$xD2	0.3245	-0.0649	0.0213	0.2817
	(0.2054)	(0.1107)	(0.0375)	(0.0567)
	[0.1688]	[0.0996]	[0.0423]	[0.1095]
$EDUCATION^2$xD3	0.0598	-0.0117	0.0110	-0.0100
	(0.0785)	(0.0509)	(0.0235)	(0.0322)
	[0.0646]	[0.0581]	[0.0247]	[0.1151]
$EDUCATION^2$xD4	-0.0995	-0.0938	-0.0513	0.2003
	(0.1287)	(0.0723)	(0.0449)	(0.0635)
	[0.0915]	[0.0648]	[0.0557]	[0.2228]
$EDUCATION^2$xD5	0.0604	0.0248	0.0272	-0.1331
	(0.0693)	(0.0471)	(0.0253)	(0.0343)
	[0.0669]	[0.0612]	[0.0301]	[0.1044]
$EDUCATION^2$xD6	0.0942	0.0306	-0.0033	-0.0326
	(0.0634)	(0.0441)	(0.0224)	(0.0326)
	[0.0652]	[0.0563]	[0.0257]	[0.1349]

Continued on next page...

MLE standard errors in parenthesis, robust standard errors in brackets.

All models include time dummies.

Table 5: Continued

Variable	ROBBERY	MOPED	ASSAULT	GRAFFITI
EDUCATION^{2}xD7	-0.0283	0.0762	0.0195	0.1867
	(0.0495)	(0.0397)	(0.0195)	(0.0236)
	[0.0562]	[0.0520]	[0.0243]	[0.1070]
EDUCATION^{2}xD8	0.0057	-0.0535	0.0033	0.1311
	(0.0355)	(0.0336)	(0.0174)	(0.0161)
	[0.0534]	[0.0507]	[0.0230]	[0.0994]
Conditional mean test	36.98	35.49	41.67	57.31
Robust Hausman test	32.86	37.67	41.20	60.49

MLE standard errors in parenthesis, robust standard errors in brackets.
All models include time dummies.

Turning to the other variables, starting with the estimation results for ROBBERY, there are only three variables that turn out significant, at conventional levels, i.e. (0.10), (0.05) and (0.01). The percentage of men aged 20 to 24, (0.05), has a negative effect on the robbery rate. The elasticity at the mean is around -1.24. The other two significant variables are the expenditure on education, both in level and its square, in sparsely populated municipalities, EDUCATIONxD2 (0.05) and EDUCATION^{2}xD2 (0.10). The signs and the magnitudes of the coefficients, -6.238 and 0.3245, respectively, indicates a negative relationship between the robbery rate and education spending in sparsely populated municipalities, which turn positive at a high level of spending. The relationship is negative up to a spending of approximately $95,000$ SKr per student, a level of spending that is above the mean spending, $87,993$, in this group of municipalities. The elasticity evaluated at the mean spending is approximately -10.0. The magnitude of the elasticity will, however, depend on how far away we are from the critical point, e.g. where the first derivative is equal to zero; the further away, the larger, in absolute terms, the elasticity.

The estimation results for ASSAULT, in the third column, also show only three significant variables; the percentage of men between the aged 15 to 19, (0.01), the percentage of immigrants, (0.01), and the percentage of the population receiving social welfare payments, (0.05). The percentage of men aged 15 to 19 has a positive impact on the assault rate in a municipality with an elasticity evaluated at the mean percentage, 3.1, of 1.1. The other two variables have smaller positive effects. The percentage of immigrants has a positive effect with an elasticity of 0.4 at the mean percentage, 3.8. The

Table 6: Moped theft elasticities

Variable	Mean	Elasticity	Sign to the left	Critical point	Sign to the right
MEN2024	2.7	1.1	x	x	x
INCOME	110,737	-2.3	x	x	x
IMMIGRANTS	3.8	-0.7	x	x	x
LEISURE for D1	1,118	1.5	+	1,560	-
LEISURE for D2	1,141	0.7	-	1,041	+
LEISURE for D3	922	-2.2	+	133	-
LEISURE for D4	767	1.8	+	1,560	-
LEISURE for D5	1,051	0.0	-	1,032	+
LEISURE for D6	988	0.2	-	650	+
LEISURE for D7	1,014	1.7	+	1,560	-
LEISURE for D8	831	20.3	-	22	+

percentage of social welfare recipients has an even smaller positive effect, with an elasticity of 0.2 at the mean, 4.3.

For the last two crimes there are more significant variables. For MOPED theft, the second column in *Table* 5, the percentage of men aged 20 to 24, (0.10), the per capita taxable income, (0.05), the percentage of immigrants, (0.05), and there are significant leisure spending in most municipality groups. We have the following significant variables; LEISURE (0.01), and the interaction between LEISURE and D2 (0.05), D3 (0.05), D5 (0.01), D6 (0.05) and D8 (0.05); LEISURE^2 (0.05), and the interaction between LEISURE^2 and D2 (0.05), D5 (0.05), D6 (0.10) and D8 (0.10). In *Table 6* the elasticities evaluated at the mean, which are displayed in the table in SKr per capita, are presented for our significant effects. *Table 6* also presents the critical point in SKr per capita, for the elasticities, and the corresponding signs on each side. For municipality groups that do not have an own significant effect, the entries in the table are calculated at the common coefficients, i.e. the coefficients without the dummy interaction.

The percentage of men aged 20 to 24 has a small positive impact with a near unit elasticity at the mean, a result that is in contrast to the estimation results for ROBBERY. Another result that is in contrast with previous discussed results is the negative impact of the percentage of immigrants with an elasticity of -0.7, which is in contrast with the ASSAULT estimation results. For the taxable income we have an elasticity at the mean of -2.3. The estimation results for LEISURE give a mixed picture of public spending on leisure and the impact on the moped theft crime rate. Half of the municipality groups have a relationship that starts out positive and eventually

turn negative. Large city (D1), rural (D4), and medium-sized city (D7) municipalities have the same relationship since D4 and D7 are not significant. The critical point is at 1,560 SKr, a level that is above the means of these groups. Hence, we have positive elasticities at the means. Furthermore, this critical point is the highest in the estimation. The last group with a positive to negative relationship, small municipalities (D3), has a much lower critical point at just above 100 SKr, resulting in a negative elasticity at the mean.

The remaining municipality groups all have a negative to positive relationship with varying critical points; 1,041 SKr for sparsely populated municipalities (D2), 1,032 SKr for industrial municipalities (D5), 650 SKr for large municipalities (D6), and finally 22 SKr for suburban municipalities (D8). The estimated elasticities at the mean are all non-negative for all these groups since they spend above the critical point in average. Noteworthy is that the suburban municipalities have a very low critical point, which basically give us a positive relationship for reasonable levels of spending.

The mixed picture is also present in the estimation results for GRAFFITI, albeit some of the relationships have the reversed signs as we shall see. In the fourth column in *Table* 5, GRAFFITI, we have no significant socioeconomic variables, but several LEISURE and EDUCATION variables are significant. All LEISURE variables are significant at the five percent level, except LEISURExD6 (0.01), LEISURE^{2}xD6 (0.01), LEISURE^{2}xD8 (0.10), and LEISURExD7 which is together with LEISURE^{2}xD7 insignificant. Turning to EDUCATION we have the following significant variables, EDUCATION (0.10), EDUCATIONxD2 (0.05), EDUCATIONxD7 (0.10), EDUCATION^2 (0.10), EDUCATION^{2}xD2 (0.01) and EDUCATION^{2}xD7 (0.10). *Table 7* displays the mean, in SKr per capita, the elasticity evaluated at the mean, the critical point and the sign of the effect for LEISURE and EDUCATION for all municipality groups.

Two of the municipality groups, large city (D1) and medium-sized (D7) city municipalities have a negative to positive relationship between public leisure spending and graffiti crime rate, and the mean spending are close to the critical point, $1,121$ SKr, in both groups. Furthermore, the relationship is reversed compared to the estimation results for moped theft. Suburban municipalities (D8) have a strictly positive relationship for positive values of expenditure. An estimation result that almost corresponds to the moped theft results, where we had a very low critical point close to zero.

All other municipality groups have a positive to negative relationship with varying critical points in the span 419 to $1,682$ SKr. Small (D3) and rural (D4) municipalities have the same order of the signs as in the estimation results for moped theft, but for the rest, the relationship is reversed.

Turning to the effect of education spending on graffiti crime rate, we find

Table 7: Graffiti elasticities

Variable	Mean	Elasticity	Sign to the left	Critical point	Sign to the right
LEISURE D1	1,118	0.0	-	1,121	+
LEISURE D2	1,141	2.4	+	1,682	-
LEISURE D3	922	1.0	+	1,469	-
LEISURE D4	767	-1.3	+	419	-
LEISURE D5	1,051	0.3	+	1,267	-
LEISURE D6	988	-1.9	+	780	-
LEISURE D7	1,014	-0.9	-	1,112	+
LEISURE D8	831	0.5	x	x	x
EDUCATION D1	69,915	1.1	+	76,213	-
EDUCATION D2	87,993	-1.0	-	91,486	+
EDUCATION D3	76,119	0.0	+	76,213	-
EDUCATION D4	72,775	0.6	+	76,213	-
EDUCATION D5	75,700	0.1	+	76,213	-
EDUCATION D6	74,122	0.4	+	76,213	-
EDUCATION D7	69,553	-0.3	-	72,463	+
EDUCATION D8	69,217	1.2	+	76,213	-

that all but two municipality groups have the same positive to negative relationship, with a critical point at 76, 213 SKr, due to the fact that there is not many significant interaction terms. Furthermore, we can see in the table that most municipality groups spend just below the critical point on average, leading to small positive elasticities at the mean. Sparsely populated municipalities (D2) have a negative to positive relationship, which corresponds with the estimation results for ROBBERY discussed above. The critical point is relatively high, 91, 486 SKr, resulting in a negative elasticity at the mean. Medium-sized city municipalities (D7) is the second municipality group with a negative to positive relationship, and have much lower critical point, 72, 463 SKr.

6.1 Specification tests

Vital for the consistency of the multinomial PMLE are the correct specification of the conditional mean and the strict exogeneity of the regressors. For specification testing two different tests are employed. The first test is a regression based conditional moment test of equation (2), including the strict exogeneity assumption, which utilize some extra orthogonality conditions implied by the FEP model (Wooldridge 1999). The second test is

a robust Hausman test, which also is regression based and robust to any distributional misspecifications, and compares the multinomial PMLE and non-linear least squares estimator with the same conditional mean, equation (3)(Wooldridge 1991). In this context, a Hausman test will indicate whether the conditional mean is misspecified or not, and does not test further distributional assumptions. Under the alternative of misspecification both estimators will generally be inconsistent and tend to different limits.

Turning to the specification tests, the last two rows in *Table* 5, which all have a critical value of 59.30 at the five percent level ($\chi^2$with 43 degrees of freedom), we cannot reject the model specification for either test for the first three crimes, ROBBERY, MOPED and ASSAULT as we are far from the critical value. For the last crime, GRAFFITI, the specification tests give mixed results. The conditional mean test is just below the critical value, and has a p-value of 0.07. Thus, at five percent level we cannot reject the conditional mean specification. However, the Hausman test is just above the critical value and has a p-value of 0.04, thus rejecting the specification at the five percent level.

7 Discussion and Concluding Remarks

The purpose of this paper was to investigate if public spending on youths affects crime rates. A non-linear fixed effect model was estimated using multinomial pseudo maximum likelihood for four different crimes using a panel of 261 Swedish municipalities over four years. As measures of expenditures on youths municipality spending on upper secondary school per pupil and leisure related spending per capita were used. Furthermore, the socioeconomic composition of the municipalities was controlled for with several different variables.

The main result of the estimation was that there is a relationship between the two spending types and two of the crimes. For robbery of individuals and assault where the offender is unknown to the victim the estimation results do not provide evidence of any relationship, whereas the estimation results for moped theft and inflicting damage with the means of graffiti, yields a fairly strong indication that there exist relationships, especially for the leisure related expenditures. However, the estimated relationships do not provide any clear cut answers. Instead the estimation results indicate complex relationships between the expenditure types and crime rates.

First of all, the estimation results imply that there is a trade off between combating different crimes: Spending that reduces the rate of one crime can increase the rate of another. However, it is quite natural to expect that dif-

ferent types of crime are affected in different ways. Furthermore, there are 'nonlinearities' in the relationships indicating increasing/decreasing effects of the expenditure types on crime rates. This implies that there are some optimal levels of spending. Another important aspect of the estimated relationships is that there are differences between different municipality types, e.g. leisure related expenditures have the opposite effect in large city municipalities compared to sparsely populated municipalities.

Although the estimation results do not provide any clear answers there are at least two wider implications of the results. First is the importance to study specific crimes, instead of studying broader crime categories. Youths are relatively more overrepresented in terms of individuals suspected and found guilty for the two crimes where there is a statistically significant effect of the spending types. This could either be due to the fact that there is no effect for the other two crimes, that there is too little variation in the data to identify any effect, or that the models are inappropriate for the two crimes where there are no statistically significant effects. However, it also indicates the importance to study specific crimes since we even at this specific level of crimes get quite different statistical outcomes. Furthermore, the trade off that is present between combating different crimes also stress the importance to study specific crimes, to reveal relationships and thereby making it possible to gain greater understanding of the underlying processes.

Studying specific crimes in small units of analysis will probably entail problems for the estimation methods usually used when studying crime rates. For some types crimes zeros will to be a common observation, which cannot be handled in log-linear or log-log continuous fixed effect models without tampering with the data. This motivates the empirical model used in this paper.

The second implication of the estimation results is that it might not be a good idea to assume homogenous effects across municipalities. Allowing for different effects, we found that both the magnitude and the direction of estimated relationships differ between different types of municipalities, which is a natural outcome if there is countervailing effects at play. Even though this might not be the case for some relationships, it should at least be considered in all investigations. It also raises the question about the level of aggregation regarding the unit of analysis. The differences between different types of municipalities would have been lost if the analysis would have been made at county level, but at the same time using municipality data we cannot disentangle the effects within a municipality, and further disaggregation might provide more answers.

This paper has found evidence that there are relationships between municipality spending on youths, in the form of overall leisure related spending

and spending on upper secondary school, and some crime rates. The measures of spending used here are rather crude, resulting in a crude picture of the relationships. From this picture it is hard, and it would be speculative too, to draw any other conclusion than that spending seems to matter and further research needs to be done in order to give policy suggestions on how to spend resources to prevent youth crime. Future research might disentangle different effects by studying more specific types of spending, i.e. the parts that makes up the total spending in this paper, from many different approaches. This could provide deeper understanding of how different types of spending affect youths' criminal behavior.

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A Appendix

A.1 Variable Definitions and Data Sources

A.1.1 Dependent Variables

All crime data is from the *National Council for Crime Prevention*, and is the number of, by the police, registered crimes in each municipality. We have the following crimes:

- **ROBBERY** - includes robberies registered as 'robberies of individuals' and 'other robberies'.
- **MOPED** - includes crimes registered as moped thefts.
- **ASSAULT** - includes assaults registered as assaults where the victim is a man and the offender was unknown to the victim.
- **GRAFFITI** - includes crimes of inflicting damage with the means of graffiti.

A.1.2 Independent Variables

The independent variables comes from different sources. The following variables are from *Statistics Sweden*, www.scb.se

- **POPULATION** - The total population during each year.
- **MEN1519** - The number of individuals aged 15 to 19 divided by the total population, times 100.
- **MEN2024** - The number of individuals aged 20 to 24 divided by the total population, times 100.
- **MOVING** - The number of individuals moving into a municipality a given year divided by the total population, times 100.
- **IMMIGRANTS** - The number of individuals with foreign citizenship divided by the total population, times 100.
- **WELFARE** - The number of social welfare recipients over 17 years of age divided by the population aged over 17, times 100.
- **INCOME** - Per capita taxable income.

The following variables are from the *Swedish Association of Local Authorities'* data base: www.komstat.svekom.se

- **LEISURE** - Leisure related municipality spending per capita in 1998 year's prices. The variable includes grants to clubs, associations etc., sports and recreational venues, and youth recreation centers.
- **EDUCATION** - Municipality spending at secondary upper school per pupil in 1998 year's prices.

The following variable is from the *National Labour Market Board*

- **UNEMPLOYMENT** - The yearly unemployment rate, measured as the percentage of individuals in the work force aged 18 to 64 registered as unemployed.

A.1.3 Municipality Dummies

The municipality dummies follow from the *Swedish Association of Local Authorities* classification of municipalities, which divides the municipalities into nine different groups. The classification is based on the following variables: population size, location, degree of urbanization, population density, and trade and industry structure. We have the following groups, where the first group is excluded from our analysis.

- **Big city municipalities**: Municipalities with a population exceeding 200,000
- **D1 - Large city municipalities**: Municipalities with an urbanization degree above 70 percent, a population that exceeds 50,000, and with less that 40 percent of the work force employed in industry.
- **D2 - Sparsely populated municipalities**: Municipality with less than five inhabitants per km^2, and with a population not exceeding 20,000.
- **D3 - Small municipalities**: Municipalities with a population less than 15,000, and do not fall into any other group.
- **D4 - Rural municipalities**: Municipalities with an urbanization degree below 70 percent, at least 8.7 percent of the work force employed in agriculture and forestry, and do not belong to the sparsely populated municipality group.
- **D5 - Industrial municipalities**: Municipalities with more than 40 percent of the workforce employed in industry, and do not belong to the sparsely populated municipality group.
- **D6 - Large municipalities**: Municipalities with a population between 15,000 and 50,000, and do not fall into any other group.
- **D7 - Medium-sized city municipalities**: Municipalities with an urbanization degree exceeding 70 percent, a population between 20,000 and 50,000, and with less than 40 percent of the work force employed in industry.
- **D8 - Suburban municipalities**: Municipalities that are suburbs to big cities, and have a work force where 50 percent commutes to other municipalities, or 25 percent commutes to big city municipalities.

A.2 Tables for figures

Table A1: Persons found guilty of criminal offences, by principal offence and age, 2000[1]

	15-20	21-29	30-49	50-	Total
All Crimes	22,775	26,552	51,201	18,175	118,721
All Penal Code Crimes	15,196	11,183	18,201	6,074	50,660
Crimes against Life and Health (ch 3)	2,551	2,051	2,903	748	8,253
Assault (ch. 3 section 5)	2,275	1,771	2,541	625	7,212
Theft, Robbery and Other Crimes of Stealing (ch. 8)	7,824	5,091	8,728	3,496	25,144
Theft (ch 8 section 1)	2,435	2,014	2,687	330	7,466
Petty Theft (ch 8 section 2)	3,380	1,980	4,978	3,015	13,358
Robbery (ch 8 section 5)	434	188	90	2	714
Vehicle Theft (ch 8 section 7)	993	377	339	19	1,728
Inflicting Damage (ch. 12)	1,366	692	605	135	2,798
Drug Crimes	1,569	2,750	3,425	309	8,055

Note: 1) If a person is found guilty of several crimes only the principal offence, i.e. the offence considered most serious, is recorded. Only district courts judgements are included. Age at the time of prosecutor decision/summary imposition of fine/judgement. Chapter and section of the penal code in parenthesis.

Source: the web site of the *National Council for Crime Prevention*, www.bra.se

Table A2: Persons suspected of criminal offences, by age, 2000[1]

	15-20	21-29	30-49	50-	Total[2]
All Crimes	20,957	19,479	32,836	11,595	84,867
All Penal Code Crimes	16,434	13,253	21,316	6,926	57,929
Crimes against Life and Health (ch. 3)	3,584	2,758	4,229	1,028	11,599
Homicide, Manslaugther, and Deadly Assault (ch. 3 section 1,2,5,6)	73	106	172	50	401
Assault (ch 3. section 5,6)	3,458	2,611	3,976	920	10,965
Assault against man	2,582	1,756	1,704	305	6,347
Assault against unfamiliar man	1,672	1,296	915	134	4,017
Theft, Robbery and Other Crimes of Stealing (ch. 8)	9,035	6,567	10,044	3,600	29,246
Burglary (ch. 8 section 1,2,4)	1,565	1,202	1,572	123	4,462
School, Library, Recreation Center, etc.	216	73	78	3	370
Industry, Construction Site, Garage, etc.	375	322	451	36	1,184
Private Houses, Week-end Houses, etc.	385	403	717	52	1,557
Theft and Petty Theft (ch. 8 section 1,2,4)	6,237	5,050	8,540	3,351	23,178
School, Library, Recreation Center, etc	220	28	44	2	294
Industry, Construction Site, Garage, etc	101	201	277	46	625
Auto Theft (ch. 8 section 7)	1,549	903	994	71	3,517
Moped Theft (ch. 8 section 7)	190	48	49	71	625
Robbery, Gross Robbery (ch. 8 section 5,6)	671	359	238	17	1,285
Robbery of Individuals	466	165	108	12	751
Inflicting Damage (ch. 12 section 1,2,3)	2,316	1,410	1,873	341	5,939
Graffiti	473	81	15	0	569
Drug Crimes	2,242	3,821	5,438	425	11,926

Notes: 1) Age at the time of the crime. Chapter and section of the penal code inside parenthesis.

2) For some suspects age is unknown, they are subtracted from the total number of suspects.

Source: the web site of the *National Council for Crime Prevention*, www.bra.se

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